

CLAIMS

What is claimed is:

1 *only* 1. A fiber optic module for coupling photons between  
2 optoelectronic devices and optical fibers, the fiber optic  
3 module comprising:  
4       a base;  
5       a first horizontal printed circuit board (PCB) arranged  
6 horizontally with the base and parallel to a first optical  
7 axis of a first optoelectronic device, the first  
8 optoelectronic device having terminals coupled to the first  
9 horizontal printed circuit board; and  
10      a second vertical printed circuit board (PCB) arranged at  
11 a perpendicular angle with the base and parallel to a second  
12 optical axis of a second optoelectronic device, the second  
13 optoelectronic device having terminals coupled to the second  
14 vertical printed circuit board.

1       2. The fiber optic module of claim 1 further comprising:  
2       a housing coupled to the base.

1       3. The fiber optic module of claim 2 wherein,  
2       the housing is a shielded housing to encase the first and  
3       second printed circuit boards to reduce electromagnetic  
4       interference (EMI).

1       4. The fiber optic module of claim 3 wherein,  
2       the housing has an inner septum to separate the fiber  
3       optic module into a first side and a second side and the inner  
4       septum is a conductive shield to reduce crosstalk  
5       electromagnetic radiation.

1       5. The fiber optic module of claim 1 wherein,  
2       the base has a first and second opening;  
3       the first horizontal printed circuit board has a  
4       plurality of pins extending through the first opening in the  
5       base to couple to a host printed circuit board; and  
6       the second vertical printed circuit board has a plurality  
7       of pins extending through the second opening in the base to  
8       couple to the host printed circuit board.

1       6. The fiber optic module of claim 5 wherein,  
2       the first and second opening in the base are a plurality  
3       of pin holes in the base.

1       7. The fiber optic module of claim 5 wherein,  
2       the first and second opening in the base are a first and  
3       second cutout in the base.

1       8. The fiber optic module of claim 1 wherein, the first  
2       horizontal and second vertical printed circuit boards further  
3       comprises:

4       electrical components coupled between the first  
5       optoelectronic device and the plurality of pins of the first  
6       printed circuit board and between the second optoelectronic  
7       device and the plurality of pins of the second printed circuit  
8       board, the electrical components for controlling the first and  
9       second optoelectronic devices.

1       9. The fiber optic module of claim 1 wherein, the first  
2       horizontal printed circuit board further comprises:  
3       a ground plane to reduce electro-magnetic fields  
4       generated by the electrical components.

1        10. The fiber optic module of claim 1 wherein, the second  
2 vertical printed circuit board further comprises:  
3            a ground plane to reduce electro-magnetic fields  
4 generated by the electrical components.

1        11. The fiber optic module of claim 1 further comprising:  
2            a first optical block coupled to the first optoelectronic  
3 device, the first optical block having a first opening to  
4 receive the first optoelectronic device, and  
5            a first lens to couple photons between the first  
6 optoelectronic device and an optical fiber.

1        12. The fiber optic module of claim 11 further  
2 comprising:  
3            a nose coupled to the base, the nose to receive an  
4 optical fiber connector and to hold an optical fiber  
5 substantially fixed and aligned with an optical opening of the  
6 optical block.

1        13. The fiber optic module of claim 12 further  
2 comprising:  
3            a nose shield surrounding the nose to reduce  
4 electromagnetic interference.

1        14. The fiber optic module of claim 1 further comprising:  
2            a second optical block coupled to the second  
3 optoelectronic device, the second optical block having  
4            a second opening to receive the second optoelectronic  
5 device, and  
6            a second lens to couple photons between the second  
7 optoelectronic device and an optical fiber.

1        15. The fiber optic module of claim 11 further  
2 comprising:  
3            a second optical block coupled to the second  
4 optoelectronic device, the second optical block having  
5            a second opening to receive the second optoelectronic  
6 device, and  
7            a second lens to couple photons between the second  
8 optoelectronic device and an optical fiber.

1        16. The fiber optic module of claim 1 further comprising:  
2            an optical block coupled to the first and second  
3 optoelectronic devices, the optical block having  
4            first and second openings to receive the first and second  
5 optoelectronic devices,  
6            a first lens to couple photons between the first  
7 optoelectronic device and a first optical fiber, and  
8            a second lens to couple photons between the second  
9 optoelectronic device and a second optical fiber.

1        17. The fiber optic module of claim 16, wherein,  
2            the first lens of the optical block to launch photons  
3 into the first optical fiber from the first optoelectronic  
4 device.

1        18. The fiber optic module of claim 16, wherein,  
2            the second lens of the optical block is a focusing lens  
3 to receive photons from the second optical fiber and to couple  
4 them to the second optoelectronic device.

1        19. The fiber optic module of claim 16 further  
2 comprising:

3       a nose coupled to the base, the nose to receive an  
4   optical fiber connector and to hold an optical fiber  
5   substantially fixed and aligned with an optical opening of the  
6   optical block.

1       20. The fiber optic module of claim 19 further  
2   comprising:

3       a nose shield surrounding the nose to reduce  
4   electromagnetic interference.

1       21. The fiber optic module of claim 13, wherein,  
2   the first optoelectronic device is a photodetector.

1       22. The fiber optic module of claim 13, wherein,  
2   the second optoelectronic device is an emitter.

1       23. The fiber optic module of claim 22, wherein,  
2   the emitter is a vertical cavity surface emitting laser  
3   (VCSEL) .

1       24. A fiber optic transceiver for coupling photons  
2   between optoelectronic devices and optical fibers, the fiber  
3   optic transceiver comprising:

4       a base;  
5       a first vertical printed circuit board (PCB) arranged at  
6   a perpendicular angle with the base and parallel to a first  
7   optical axis of a first optoelectronic device, the first  
8   vertical printed circuit board having a first connecting means  
9   to couple to an external printed circuit board, the first  
10   optoelectronic device having terminals coupled to the first  
11   vertical printed circuit board;

12       a second slanted printed circuit board (PCB) arranged at